AMENDMENTS TO THE DRAWINGS

Please cancel drawing Figs. 8-12.

REMARKS

These remarks are in reply to the Office Action mailed December 20, 2005.

Specification

The specification has been updated to reflect the issuance of U.S. Patent No. 6,690,464.

The specification has also been amended in conformance with suggestions listed on page 4 of the Office Action. Specifically, the application has been objected to under MPEP 608.01(p) as improperly incorporating subject matter from U.S. Application No. 09/345,672, and now stands rejected under 35 U.S.C. 132(a) as including new mater for having copied into the application that same subject matter. Applicant respectfully submits that MPEP 608.01(p) and the cases that it cites are not applicable to the facts in this case. But in the interest of advancing prosecution of this application, applicants have deleted the subject matter and the incorporation by reference from this application.

Claim Objections

Claim 41 was objected to as including insufficient antecedent basis for the term "the step of illuminating using a tunable filter." This issue has been addressed by the addition of a comma that clarifies that the tunable filter is not included in the step of illuminating. Minor typographical and antecedent issues have also been addressed in claims 11 and 40.

Independent Claim 1

The invention as now presented in amended claim 1 relates to a chemical imaging spectrometer in which a first illumination source and a two-dimensional infrared image detector are each on a same side of a detection area. This defines a first reflecting angular path, which goes from the first illumination source to the detection area, and then continues on to the two-dimensional infrared image detector. Similarly, a second illumination source in the array is also on the same side of the detection area, and this defines a second, different reflecting angular path, which goes from the second

illumination source to the detection area, and then continues on to the two-dimensional infrared image detector.

The use of multiple reflecting angled paths in the manner claimed ensures that at least some of the light provided to the detector is off-axis light. This allows imaging infrared reflectance spectrometers according to the invention to create higher-quality images by eliminating or reducing the amount of specularly reflected infrared light that reaches the detector from the surface of the sample. This type of reflected light is undesirable in chemical imaging experiments because it does not include any chemical imaging information. It can therefore interfere with the detection of diffusely reflected light, which contains chemical information resulting from its interaction with chemical components of the sample. The claimed approach can thus provide significant improvements in dynamic range over prior art infrared imaging systems, which have generally employed through-the-lens single-source illumination systems.

The claimed approach can also improve the quality of infrared chemical images by preventing shadows from being created on the sample. This allows better spectral and spatial information about the sample to be provided to a two-dimensional infrared image detector. It can also allow more of the areas of even the most irregularly shaped sample to be uniformly illuminated with infrared light. The result is a two-dimensional chemical image that does not exhibit darker and lighter areas, but instead shows a uniform picture of the chemical properties of a surface.

Claim 1 stands rejected as obvious over Kley et al. in view of Erickson. Kley et al. disclose a non-invasive technique for measuring blood analyte concentration in mammals. In this technique, electromagnetic energy from a light source is passed through the tissue being sampled (typically the ear lobe or finger) to one or more detectors (col. 4, lines 21-24, col. 8, lines 65-67). A combination of sources are said to be used to provide a broad spectral response (col. 6, lines 53-55).

But Kley et al. do not disclose a chemical imaging spectrometer with illumination sources and an image detector all positioned at different positions on a same side of a detection area to define different reflecting angular paths that go from the illumination sources to the detection area and then continue on to the image detector. Kley et al. instead disclose a non-invasive technique that uses different filters to produce a blood

analyte concentration measurement value for mammals by passing light through a body part. Nowhere do Kley et al. disclose or suggest a two-dimensional infrared image detector, and they certainly do not even hint at the idea of using different reflecting angular paths from different detectors to provide an enhanced image to an imaging detector. Kley et al. therefore fail to disclose or suggest the invention as now claimed.

Erickson presents instruments with an array of light-emitting diodes or lasers that shine light through a turbid sample at particular discrete wavelengths (col. 1, line 34). These instruments each include a collimator or modulator array (14, 28) that discriminates against off-axis light (col. 8, lines 48-49). Erickson states that this selection of on-axis light is "necessary" (col.11, lines 39-41).

But Erickson fails to disclose illumination sources and an image detector all positioned at different positions on a same side of a detection area to define different reflecting angular paths that go from the illumination sources to the detection area and then continue on to the image detector. Erickson instead presents a device that sends discrete wavelengths of light through a turbid sample, such as a body part. Nowhere does Erikson disclose or suggest the idea of using different reflecting angular paths from different detectors to provide an enhanced image at an infrared imaging detector.

Moreover, Erickson's on-axis selection teachings are inconsistent with the concept of having light from different sources follow different angled reflected paths to an image detector on the same side as the sources as now presented in amended claim 1. Specifically, Erickson's device employs collimation or modulation to select for on-axis light that penetrates through a turbid sample without being scattered, and his disclosure qualifies this selection of on-axis light as "necessary" to reduce the amount of light received from neighboring light-emitting diodes (col.11, lines 36-41). If anything, therefore, Erickson teaches away from the desirablity of providing light from more than one source to a single image detector in a chemical imaging spectrometer. He also teaches away from the concept of using different angled paths that can reduce specular reflection. And he clearly does not teach the use of sources and an image detector on a same side of a detection area to define different reflecting angular paths that go from the illumination sources to the detection area and then continue on to the image detector, as now required by amended claim 1.

Claims 41 and 58 distinguish over the prior art of record for at least reasons similar to those advanced in support of claim 1. The remaining claims are dependent and should be allowable for at least the reason that they depend on an allowable claim.

Should further questions arise concerning this application, the Examiner is invited to call Applicants' representative at the number listed below. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to Deposit Account No. 50-0750.

Respectfully submitted,

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